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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Penn

Art Unit: 2872

Serial No.: 10/032,906

Examiner: Allen, Denise S.

Filed: 28 December 2001

Docket No. TI-30544

For: THREE DIMENSIONAL PROJECTION SYSTEM

APPEAL BRIEF TRANSMITTAL

14 June 2004

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

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Charles A. Brill — 14 June 2004
Charles A. Brill — Date

Sir:

Transmitted herewith in triplicate is an Appeal Brief in the above-identified application.

Please charge the $330.00 fee for filing the Brief to the deposit account of Texas Instruments Incorporated, Account No. 20-0668.

Charge any additional fees, or credit overpayment to Deposit Account No. 20-0668. Three copies of this sheet are enclosed.

Respectfully submitted,

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APPEAL BRIEF UNDER 37 C.F.R. § 1.192

14 June 2004

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Charles A. Brill — 14 June 2004

Charles A. Brill — Date

Dear Sir:

The following Appeal Brief is respectfully submitted, in triplicate, in connection with the above-identified application in response to the Final Rejection mailed 13 January 2004, and the Advisory Action mailed 11 May 2004. Please charge all required fees to the deposit account of Texas Instruments Incorporated, Deposit Account No. 20-0668.

REAL PARTY IN INTEREST

The real party in interest is Texas Instruments Incorporated, to whom this application is assigned.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to the Applicant's legal representative.

STATUS OF THE CLAIMS

This application was filed on 28 December 2001 with thirty two claims, two of which were written in independent form. Claims 21 and 22 were canceled, and Claims 1, 17, and 18 amended on 27 October 2003. No claims have been allowed.

STATUS OF THE AMENDMENTS

An amendment filed 27 October 2003 in response to the non-final rejection canceled Claims 21 and 22, and amended Claims 1, 17, and 18. A response to the final rejection was filed on 13 April 2004 but did not amend the claims.

SUMMARY OF THE INVENTION

The specification, from line 10 of page 6 through line 3 of page 9 provides a concise explanation of the invention defined in the appealed claims.

As shown in Figure 1 of the specification, light source 102 emits a white light beam 104 which is focused onto a clear aperture of a recycling integrator 106. After leaving the exit end of the integrator, the homogenized light beam strikes a sequential color filter 108. The filtered light beam, is separated by a polarizing beam splitter 116. The polarizing beam splitter 116 separates the light beam into two separate light beams. A first portion of the light beam having a first polarization state is passed to a first spatial light modulator 112. A second portion of the light beam having a second polarization state is reflected to a second spatial light modulator 114.

The two modulators 112, 114 receive pixel data from a controller 118 and use the pixel data to modulate the light incident each of the modulators. The first and second modulated light beams pass back through the polarizing beam splitter 116 and are

combined into a single modulated light beam. A projection lens 118 receives the modulated light beam and focuses the modulated light beam on an image plane 120.

Reflective spatial light modulators 112, 114 typically use an illumination beam 124 that strikes the modulator at an angle that is very close to normal to the surface of the modulator. The modulated light beam 126 leaves the modulator at an angle that is normal to the surface of the modulator or very close to the normal angle. Thus, there is very little separation between the incident illumination beam 124 and the reflected modulated beam 126 bearing the image. The lack of separation makes it difficult to place the projection lens 118 and the sequential color filter 108 in the projection and illumination light paths without interfering with each other.

A TIR prism 128 is used to spatially separate the projection and illumination light beams. The TIR prism assembly 128 is comprised of two prisms which reflect the illumination beam 124 at the interface between the two prisms while allowing the projection light beam 126 to pass through the light beams.

A viewer uses polarizing eyewear 122 to view the projected image. The polarizing eyewear 122 allows light of one polarization to pass through to the viewer's left eye, and light of the other polarization to pass through to the viewer's right eye. By providing proper pixel data to the modulators 112, 114, the perception of a three dimensional image is created.

ISSUES

1. Whether Claim 1 is anticipated by U.S. Patent 5,552,840 to Ishii et al. under 35 U.S.C. § 102 (b).

2. Whether Claim 17 is anticipated by U.S. Patent 5,552,840 to Ishii et al. under 35 U.S.C. § 102 (b).

3. Whether Claims 14, 15, 31 and 32 are unpatentable over U.S. Patent 5,552,840 to Ishii et al. in view of U.S. Patent No. 6,097,456 to Wang under 35 U.S.C. § 103 (a).

GROUPING OF THE CLAIMS

Claims 1, 14, 15, 17, 31 and 32 are independently patentable and stand or fall individually for the reasons more clearly set forth hereinbelow. Claims 2-13 and 16 stand or fall together with Claim 1, from which Claims 2-13 and 16 depend. Claims 18-20 and 23-30 stand or fall together with Claim 17, from which Claims 18-20 and 23-30 depend.

ARGUMENTS

Issue 1: Whether Claim 1 is anticipated by U.S. Patent 5,552,840 to Ishii et al. under 35 U.S.C. § 102 (b).

Claim 1 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,552,840 to Ishii et al. ("Ishii"). The applicant respectfully disagrees.

"A person shall be entitled to a patent unless," creates an initial presumption of patentability in favor of the applicant. 35 U.S.C. § 102. "We think the precise language of 35 U.S.C. § 102 that, "a person shall be entitled to a patent unless," concerning novelty and unobviousness, clearly places a burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103, see Graham and Adams." *In re Warner*, 379 F.2d 1011, 1016 (C.C.P.A. 1967) (referencing *Graham v. John Deere Co.*, 383 U.S. 1 (1966) and *United States v. Adams*, 383 U.S. 39 (1966)). "As adapted to *ex parte* procedure, *Graham* is interpreted as

continuing to place the 'burden of proof on the Patent Office which requires it to produce the factual basis for its rejection of an application under sections 102 and 103'." *In re Piasecki*, 745 F.2d 1468 (Fed. Cir. 1984) (citing *In re Warner*, 379 F.2d at 1016).

"The prima facie case is a procedural tool which, as used in patent examination (as by courts in general), means not only that the evidence of the prior art would reasonably allow the conclusion the examiner seeks, but also that the prior art compels such a conclusion if the applicant produces no evidence or argument to rebut it." *In re Spada*, 911 F.2d 705, 708 n.3 (Fed. Cir. 1990).

The applicant respectfully submits the Examiner has failed to meet the burden of proof required to establish a *prima facie* case of anticipation. Section 2131 of the Manual of Patent Examiner's Procedure provides:

> "'A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference.' *Verdegaal Bros. v. Union Oil Co. Of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053, (Fed. Cir. 1987). . . . 'The identical invention must be shown in as complete detail as contained in the . . . claim.' *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as in the claim under review . . . . *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990)."

Claim 1 recites, "a polarizing beam splitter on said illumination path" and "a total internal reflection prism on said illumination and projection path." The Examiner has not produced any factual basis that Ishii anticipates Claim 1. To the contrary, the Examiner

states Ishii's reference 70 is a polarizing beam splitter. Ishii describes the prism assembly in detail from line 65 of column 7 through line 26 of column 8.

The Examiner does not provide any teaching in Ishii as evidence for the Examiner's unexplained transformation of Ishii's polarizing beam splitter into a total internal reflection prism as recited by Claim 1, nor does the Examiner provide any suggestion in Ishii that would lead one of ordinary skill in the art to substitute a total internal reflection prism for Ishii's polarizing beam splitter.

Furthermore, substitution of a total internal reflection prism for Ishii's polarizing beam splitter would still not anticipate Claim 1, as Claim 1 recites both "a polarizing beam splitter on said illumination path" and "a total internal reflection prism on said illumination and projection path."

The Examiner stated, "The argument that Ishii et al fails to teach a total internal reflection prism is not persuasive because the total internal reflection prism is not distinguished from the polarizing beam splitter and can be interpreted to be the same element. Further, the specification defines the total internal reflection prism as comprising of two prisms that reflect the illumination beam and pass the projection beam (page 9 lines 1-3). In light of the specification, the polarization beam splitter (reference 70) of Ishii et al meets both the total internal reflection prism and the polarization beam splitter as claimed."

The Examiner fails to appreciate the function of the total internal reflection prism and the contrast in its operation compared to a polarizing beam splitter. The McGraw-Hill Dictionary of Scientific and Technical Terms, fifth edition, defines total internal reflection as "A phenomenon in which electromagnetic radiation in a given medium

which is incident on the boundary with a less-dense medium (one having a lower index of refraction) at an angle less than the critical angle is completely reflected from the boundary." As stated by the specification, "there is very little separation between the incident illumination beams 124 and the reflected modulated beam 126 bearing the image. The lack of separation makes it difficult to place the projection lens 118 and the sequential color filter 108 in the projection and illumination paths without interfering with each other." Lines 17-20 of page 8. Figure 1 clearly shows the TIR prism 128 reflecting the beam of light striking the interface at less than the critical angle while passing the other beam of light which strikes the interface as greater than the critical angle.

Not only does the Examiner fail to present any evidence that Ishii shows, teaches, or suggests a total internal reflection prism as recited by Claim 1, Ishii teaches away from just a modification. Ishii requires the use of a polarization-based element by stating, "Any optical member, which divides non-polarized light into S-polarized light and P-polarized light, and which allows both polarized lights reflected from the liquid crystal display elements 12 and 12' (i.e., polarized lights having image information) to come out of the optical member under the condition that both polarized lights are combined, can be used." There is no indication that a TIR prism would function in Ishii's display as the light beams strike the prism at the same angle, or that an additional polarization beam splitter would function in the applicants recited invention in place of the recited TIR prism.

For the reasons argued above, the Examiner's rejection is unsupported by the prior art, fails to provide any evidence in the art to support the rejection, and fails to establish a prima facie case of anticipation, and therefore should be withdrawn.

Issue 2: Whether Claim 17 is anticipated by U.S. Patent 5,552,840 to Ishii et al. under 35 U.S.C. § 102 (b).

Claim 17 was rejected under 35 U.S.C. § 102(b) as being anticipated by Ishii. The applicant respectfully disagrees.

Claim 17 recites, "splitting said filtered light beam into a first beam having a first polarization state and a second beam having a second polarization state" and "separating said filtered light beam from said first and second beams using a total internal reflection prism." The Examiner has not produced any factual basis that Ishii anticipates Claim 17. To the contrary, the Examiner states Ishii's reference 70 is a polarizing beam splitter. Ishii describes the prism assembly in detail from line 65 of column 7 through line 26 of column 8.

The Examiner does not provide any teaching in Ishii as evidence for the Examiner's suggestion Ishii separates the filtered beams using a total internal reflection prism as recited by Claim 17, nor does the Examiner provide any suggestion in Ishii that would lead one of ordinary skill in the art to use a total internal reflection prism for instead of Ishii's polarizing beam splitter.

The Examiner stated, "The argument that Ishii et al fails to teach a total internal reflection prism is not persuasive because the total internal reflection prism is not distinguished from the polarizing beam splitter and can be interpreted to be the same element. Further, the specification defines the total internal reflection prism as

comprising of two prisms that reflect the illumination beam and pass the projection beam (page 9 lines 1-3). In light of the specification, the polarization beam splitter (reference 70) of Ishii et al meets both the total internal reflection prism and the polarization beam splitter as claimed."

The Examiner fails to appreciate the function of the total internal reflection prism and the contrast in its operation compared to a polarizing beam splitter. The McGraw-Hill Dictionary of Scientific and Technical Terms, fifth edition, defines total internal reflection as "A phenomenon in which electromagnetic radiation in a given medium which is incident on the boundary with a less-dense medium (one having a lower index of refraction) at an angle less than the critical angle is completely reflected from the boundary." As stated by the specification, "there is very little separation between the incident illumination beams 124 and the reflected modulated beam 126 bearing the image. The lack of separation makes it difficult to place the projection lens 118 and the sequential color filter 108 in the projection and illumination paths without interfering with each other." Lines 17-20 of page 8. Figure 1 clearly shows the TIR prism 128 reflecting the beam of light striking the interface at less than the critical angle while passing the other beam of light which strikes the interface as greater than the critical angle.

Not only does the Examiner fail to present any evidence that Ishii shows, teaches, or suggests the use of a total internal reflection prism as recited by Claim 17, Ishii teaches away from just a modification. Ishii requires the use of a polarization-based element by stating, "Any optical member, which divides non-polarized light into S-polarized light and P-polarized light, and which allows both polarized lights reflected from the liquid

crystal display elements 12 and 12' (i.e., polarized lights having image information) to come out of the optical member under the condition that both polarized lights are combined, can be used." There is no indication that a TIR prism would function in Ishii's display as the light beams strike the prism at the same angle, or that a polarization beam splitter would function in the applicants recited invention in place of the recited TIR prism.

For the reasons argued above, the Examiner's rejection is unsupported by the prior art, fails to provide any evidence in the art to support the rejection, and fails to establish a prima facie case of anticipation, and therefore should be withdrawn.

Issue 3: Whether Claims 14, 15, 31 and 32 are unpatentable over U.S. Patent 5,552,840 to Ishii et al. in view of U.S. Patent No. 6,097,456 to Wang under 35 U.S.C. § 103 (a).

Claims 14, 15, 31 and 32 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ishii in view of U.S. Patent No. 6,097,456 to Wang ("Wang"). The applicant respectfully disagrees.

Claims 14 and 15 depend from Claim 1, and Claims 31 and 32 depend from Claim 17 and should be deemed allowable for that reason an on their own merits. For the reasons argued above with respect to independent Claims 1 and 17, the Examiner has failed to make a prima facie case of anticipation of the base claim, much less the limitations of the base claim in combination with the additional limitations of dependent Claims 14, 15, 31 and 32.

Claim 14 recites, "a solid integrating rod having a mirrored input aperture." Claim 15 recites, "a hollow integrating rod having a mirrored input aperture." Claim 31

recites, "homogenizing said light beam using a solid integrating rod having a mirrored input aperture." Claim 32 recites, "homogenizing said light beam using a hollow integrating rod having a mirrored input aperture."

The Examiner stated, "Ishii et al does not teach a recycling integrator on said illumination path for homogenizing said light beam prior to said sequential color filter." The Examiner further states, "Wang teaches a display system (Figure 1 reference 100) with a recycling integrator (reference 130) on an illumination path for homogenizing a light beam (column 3 lines 51-55) prior to a sequential color filter (reference 120)."

The applicant respectfully submits that Wang does not teach a recycling integrator as stated by the Examiner. Wang teaches a plain integrator 130 and shows that light passing through the integrator to the reflector may reflect about the reflector and be returned to the integrator. The Examiner stated the separate optical reflector "is inherently mirrored and functions as the input aperture to the solid integrating rod (reference 130)."

While the reflector does reflect light to the integrating rod, it clearly is not the an input aperture as recited by the claims and taught by Figures 3 and 4 of the present application. The lamp reflector furthermore does not function in the same manner as the input aperture. Just as the reflector of Wang collimates the beam of light from the reflector to the color filter array, the light reflected by the color filter array will be collimated and focused onto the light source 202 and therefore blocked by the light source 202 from returning to the integrator. A mirrored input aperture on the integrating rod does not require two reflections as does Wang's lamp reflector, nor does the mirrored input aperture risk the returning light being blocked by the light source 202. Thus, the

Examiner's assertion that the lamp reflector inherently functions as a mirrored input aperture is incorrect and the rejection under 35 U.S.C. § 103 (a) should be withdrawn.

CONCLUSION

For the foregoing reasons, Appellants respectfully submit that the Examiner's final rejection of Claims 1-20 and 23-32 is improper, and it is respectfully requested that the Board of Patent Appeals and Interferences so find and reverse the Examiner's rejection.

Please charge any fees necessary in connection with the filing of this paper, including any necessary extension of time fees, to Deposit Account No. 20-0668 of Texas Instruments Incorporated.

Respectfully submitted,

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APPENDIX

1. (previously amended) An image display system comprising:

a light source for providing a beam of light along an illumination path;

a sequential color filter on said illumination path for filtering said beam of light;

a polarizing beam splitter on said illumination path for separating said filtered light beam into a first beam having a first polarization state and a second beam having a second polarization state;

a first spatial light modulator receiving and selectively modulating said first beam;

a second spatial light modulator receiving and selectively modulating said second beam;

a total internal reflection prism on said illumination and projection path; and

at least one projection lens on a projection path for focusing said first and second beams on an image plane.

2. (original) The three dimensional image display system of Claim 1, said polarizing beam splitter combining said modulated first and second light beams.

3. (original) The three dimensional image display system of Claim 1, said sequential color filter comprising a color wheel.

4. (original) The three dimensional image display system of Claim 1, said sequential

color filter comprising a spiral color wheel.

5. (original) The three dimensional image display system of Claim 1, comprising:

at least one prism in said illumination and said projection paths for separating said filtered illumination light beam and said modulated light beam.

6. (original) The three dimensional image display system of Claim 1, comprising:

a first prism in said illumination and said projection paths for separating said first beam directed to said first modulator and said modulated first beam from said first modulator; and

a second prism in said illumination and said projection paths for separating said second beam directed to said second modulator and said modulated second beam from said second modulator.

7. (original) The three dimensional image display system of Claim 1, modulated light from said first modulator passing through a first projection lens and light from said second modulator passing through a second projection lens.

8. (original) The three dimensional image display system of Claim 1, wherein said first and second modulators are positioned such that pixelated images from said first and second modulators are offset by approximately one-half pixel in a horizontal direction at said image plane.

9. (original) The three dimensional image display system of Claim 1, wherein said first and second modulators are positioned such that pixelated images from said first and second modulators are offset by approximately one-half pixel in a

vertical direction at said image plane.

10. (original) The three dimensional image display system of Claim 1, wherein said first and second modulators are positioned such that pixelated images from said first and second modulators are offset by approximately one-half pixel in both a horizontal and a vertical direction at said image plane.

11. (original) The three dimensional image display system of Claim 1, said first modulator comprising a micromirror device.

12. (original) The three dimensional image display system of Claim 1, said first modulator comprising a liquid crystal device.

13. (original) The three dimensional image display system of Claim 1 comprising:

a recycling integrator on said illumination path for homogenizing said light beam prior to said sequential color filter.

14. (original) The three dimensional image display system of Claim 13, wherein said recycling integrator is a solid integrating rod having a mirrored input aperture.

15. (original) The three dimensional image display system of Claim 13, wherein said recycling integrator is a hollow integrating rod having a mirrored input aperture.

16. (original) The three dimensional image display system of Claim 1, comprising polarized eyewear for a viewer of said image display system.

17. (previously amended) A method of producing an image, said method comprising:

providing a beam of light along an illumination path;

sequentially color filtering said beam of light;

splitting said filtered light beam into a first beam having a first polarization state and a second beam having a second polarization state;

modulating said first beam using a first spatial light modulator;

modulating said second beam using a second spatial light modulator;

separating said filtered light beam from said first and second beams using a total internal reflection prism; and

focusing said first and second modulated light beams on an image plane.

18. (previously amended) The method of Claim 17, comprising:

combining said modulated first and second light beams.

19. (original) The method of Claim 17, said sequentially color filtering comprising sequentially filtering said beam of light using a color wheel.

20. (original) The method of Claim 17, said sequentially color filtering comprising sequentially filtering said beam of light using a spiral color wheel.

21. (canceled)

22. (canceled)

23. (original) The method of Claim 17, said focusing said first and second modulated light beams on an image plane comprising:

focusing said first modulated light beam on said image plane using a first lens; and

focusing said second modulated light beam on said image plane using a second lens.

24. (original) The method of Claim 17, said first and second modulators forming pixelated images on said image plane; comprising:

positioning said first and second modulators such that said pixelated images are offset by approximately one-half pixel at said image plane.

25. (original) The method of Claim 17, said first and second modulators forming pixelated images on said image plane; comprising:

positioning said first and second modulators such that said pixelated images are offset by approximately one-half pixel in a horizontal direction at said image plane.

26. (original) The method of Claim 17, said first and second modulators forming pixelated images on said image plane; comprising:

positioning said first and second modulators such that said pixelated images are offset by approximately one-half pixel in a vertical direction at said image plane.

27. (original) The method of Claim 17, said first and second modulators forming pixelated images on said image plane; comprising:

positioning said first and second modulators such that said pixelated images are offset by approximately one-half pixel in both a horizontal and a vertical direction at said image plane.

28. (original) The method of Claim 17, said modulating said first beam comprising:

modulating said first beam using a micromirror device.

29. (original) The method of Claim 17, said modulating said first beam comprising:

modulating said first beam using a liquid crystal device.

30. (original) The method of Claim 17, comprising:

homogenizing said light beam using a recycling integrator prior to sequentially color filtering said beam of light.

31. (original) The method of Claim 30, said homogenizing said light beam using a recycling integrator comprising:

homogenizing said light beam using a solid integrating rod having a mirrored input aperture.

32. (original) The method of Claim 30, said homogenizing said light beam using a recycling integrator comprising:

homogenizing said light beam using a hollow integrating rod having a mirrored input aperture.